

SUIT WESTSIDE CBM SEEP CAPTURE AND USE PROJECT MONITORING REPORT #1



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1 PROJECT DETAILS

1.1 Summary Description of Project

The proposed Westside Interceptor well project consists of three activities: (1) interception and removal of fugitive coalbed methane, (2) piping raw gas to a compression station and gas processing plant which uses an amine gas scrubber process to produce pipeline quality natural gas (3) compression and injection of the purified gas into a natural gas transmission pipeline.

The purpose of this Monitoring Report for the SUIT project is to calculate the emission reductions achieved by the project activity in the period covered by this report. This report serves as the basis for the verification of these emissions reductions and the issuance of Voluntary Carbon Units (VCUs).

1.2 Sectoral Scope and Project Type

The SUIT project falls into Sectoral Scope Numbers 1 and 10 as defined by the United Nations Framework Convention on Climate Change (UNFCCC) and the Voluntary Carbon Standard (VCS).

1.3 Project Proponent

Southern Ute Indian Tribe – Growth Fund - Department of Energy

The Southern Ute Indian Tribe – Growth Fund or “SUGF” is the project proponent. SUGF is a division of the Southern Ute Indian Tribe and is responsible for developing energy producing assets on the reservation.

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Role of SUGF in the project

SUGF is the sole equity owner of the project and is responsible for all aspects of operations and management. Additionally SUGF will be responsible for all efforts to monetize and market VCUs generated from the project. WSP Environment & Energy, a consultant with SUGF, will assist in the validation and verification process.

1.4 Other Entities Involved in the Project

Red Cedar – Davis Dunagan – ddunagan@redcedargathering.com

Red Cedar is responsible for gas cleanup, processing and marketing

Red Willow – Cindy Percell – cpercell@rwpc.us

Red Willow is responsible for operations and maintenance including the monitoring of key project parameters and calibration of equipment.

WSP Environment & Energy – Mike Huisenga – mike.huisenga@wspgroup.com

WSP E&E is responsible for compiling the annual monitoring reports.

1.5 Project Start Date

The project began operations on 01 January, 2009

1.6 Project Crediting Period

The project crediting period began on 01 January, 2009 and will end 31 December, 2018 for a total of 10 years.

1.7 Project Location

The methane capture project is located in La Plata County, Colorado, United States. The project site is situated approximately 25 miles west of Ignacio, Colorado where the tribe's headquarters is located. The gas compression station, processing plant, and well head are also located at this site but approximately 1.5 miles south. The zip code for this location is 81326. The project is located in the WECC Rockies eGRID sub-region. The boundaries of the project include the 16 wells used to intercept and collect methane. The project GPS boundaries are shown in Table 2. Gas compression and upgrading equipment shared by other CBM operations are not included in this boundary.

Figure 1: Map of Colorado showing location of La Plata County

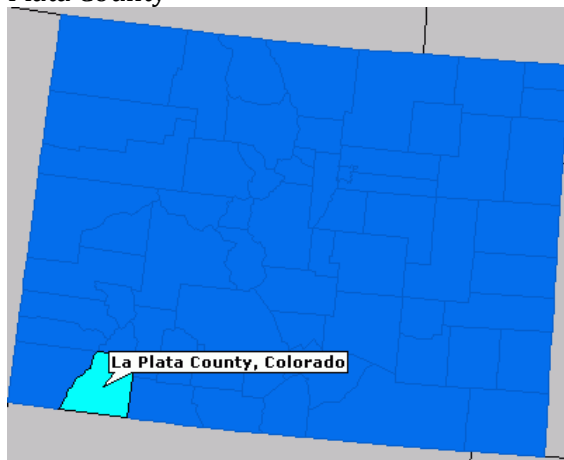


Figure 2: Map of La Plata County, CO, showing project location starred

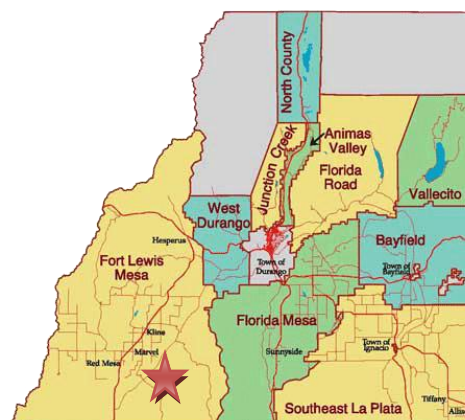


Table 2: Project GPS Boundaries including the vent well collection system

Boundary	Latitude (degrees)	Longitude (degrees)
Northwest	37.052817	-108.080298
Northeast	37.052727	-108.089428
Southeast	37.003401	-108.102099
Southwest	37.003552	-108.113645

1.8 Title and Reference of Methodology

The project participants use the approved VCS baseline and monitoring methodology VM0014 "Interception and destruction of fugitive methane from Coal Bed Methane (CMB) seeps", Version 1.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The project is currently active. Commercial operations began on January 1, 2009 and the project has been operating continuously since then.

2.2 Deviations from the Monitoring Plan

After the Validation and initial Verification Reports were issued, the project participants determined that one of the interceptor wells, VW011, should be removed from the project and the quantities of emission reductions generated by the project during each year 2009-2011 must be revised. Since the project monitoring methodology involves measuring volumes of intercepted gas at a central collection point (the CDP), rather than by summing measurements from individual wells a new calculation is required to remove the energy production of VW011. In order to quantify the emission reductions contributed by well VW011 and adjust the total amount of emission reductions generated by the project a deviation from the monitoring plan is required.

Specifically, we introduce an additional parameter, termed EP_{VW011} , that accounts for the share of energy production arising from VW011 relative to the total energy produced by all wells and delivered to the CDP for a given year. Since the calculation of project emissions which arise from energy use to compress and clean the captured methane are computed on a *pro rata* basis by Red Willow, this approach preserves the technical accuracy of estimating both captured methane values (baseline emissions) as well as energy use in on-site equipment (project emissions). This parameter is used to calculate the proportion of energy in the gas produced annually, measured at the VW011 wellhead relative to the sum of energy in the gas produced annually, measured at the CDP. This is then used to discount the values of parameters monitored by the project which are used to calculate project and baseline emission values. Four monitored parameters which are only available on invoices issued by Red Willow to the project participants require modification as described.

The calculations are expressed as:

$$CONS_{FossilFuel,PJ_New,y} = CONS_{FossilFuel,PJ,y} \times (1 - EP_{VW011,y})$$

Where:

$CONS_{FossilFuel,PJ_New,y}$	= Corrected value of the consumption of CBM fuel gas by individual wellhead compressors in year y (MMBtu)
$CONS_{FossilFuel,PJ,y}$	= Consumption of CBM fuel gas by individual wellhead compressors as monitored by the project and reported on operations invoices in year y (MMBtu)
$EP_{VW011,y}$	= Share of energy production from well VW001 relative to the total gross energy production from all connected vent wells feeding the central delivery point (CDP), in year y

$$CM_{MECH,CS,PJ_New} = CM_{MECH,CS,PJ,y} \times (1 - EP_{VW011,y})$$

Where:

$CM_{MECH,CS,PJ_New,y}$	= Corrected value of the captured CBM used as fuel gas at the coyote gulch compressor station to compress gas for deliver to treatment in year y (MMBtu)
$CM_{MECH,CS,PJ,y}$	= Captured CBM used as fuel gas at the coyote gulch compressor station to compress gas for deliver to treatment, as monitored by the project and reported on operations invoices in year y (MMBtu)
$EP_{VW011,y}$	= Share of energy production from well VW001 relative to the total gross energy production from all connected vent wells feeding the central delivery point (CDP), in year y

$$CM_{MECH,TP,PJ_New} = CM_{MECH,TP,PJ,y} \times (1 - EP_{VW011,y})$$

Where:

$CM_{MECH,TP,PJ_New,y}$	= Corrected value of captured CBM used as process fuel gas at the coyote gulch treating plant, in year y (MMBtu)
$CM_{MECH,TP,PJ,y}$	= Captured CBM used as process fuel gas at the coyote gulch treating plant, as monitored by the project and reported on operations invoices, in year y (MMBtu)
$EP_{VW011,y}$	= Share of energy production from well VW001 relative to the total gross energy production from all connected vent wells feeding the central delivery point (CDP), in year y

$$CM_{GAS,PJ_New} = CM_{GAS,PJ,y} \times (1 - EP_{VW011,y})$$

Where:

$CM_{GAS,PJ_New,y}$	= Corrected value of the captured CBM cleaned, compressed and delivered to the natural gas grid, in year y (MMBtu)
$CM_{GAS,PJ,y}$	= Captured CBM cleaned, compressed and delivered to the natural gas grid, as monitored by the project and reported on operations invoices, in year y (MMBtu)
$EP_{VW011,y}$	= Share of energy production from well VW011 relative to the total gross energy production from all connected vent wells feeding the central delivery point (CDP), in year y

$$EP_{VW011,y} = \frac{Vol_{VW011,y} \cdot Btu_{VW011,y}}{CM_{CDP,y} \cdot 10^3}$$

Where:

$EP_{VW011,y}$	= Share of energy production from well VW011 relative to the total gross energy production from all connected vent wells feeding the central delivery point (CDP), in year y
$Vol_{VW011,y}$	= Total volume of gas captured by well VW011 during year y (MCF)
$Btu_{VW011,y}$	= Average Btu content of gas captured by well VW011 during year y (Btu/scf)
$CM_{CDP,y}$	= Total energy production from each well <i>i</i> feeding into and metered at the central delivery point (CDP) during year y (MMBtu)

Analysis of additional monitored data which is collected by Red Willow but which is not collected as part of the GHG reduction project activity is used to establish the proportion of gas produced by well VW011 in relation to the total gas produced by the project. Gas flow meters at each wellhead continuously measure the total volume of gas captured at the individual wells. A portable gas chromatograph (GC) is used to determine gas composition, which together with the continuous volumetric flow rate data, is used to establish the gas energy production on a million Btu (MMBtu) basis at the Cinder Buttes #4 well.

Gas flow meters at the individual wellheads are calibrated twice per year according to a Red Willow company procedure. A copy of the gas flow meter calibration records for the individual wellheads is provided along with this report for 2009 and 2010. However, 2011 records were not available during verification. Gas composition analysis, using a portable GC, is conducted approximately three times per year at each wellhead. The GCs are calibrated prior to each sampling event. The gas composition results and associated calibration records are provided along with this report. Since the methodology VM0014 requires regular (hourly/daily) sampling and analysis of gas compositions and the composition analysis is only available three times per year, a conservative approach was used to assign methane content (and Btu/SCF) values to gas flows from CB #4. The approach proposed is to use the highest of three measured values: measured in the current quarter, next measurement after the current quarter, or the last measurement before the current quarter. Then, these conservative quarterly readings are multiplied by quarterly total gas flows to determine MMBtus generated on a quarterly basis.

The total energy generated by the Cinder Buttes #4 well (Well ID VW011) and the total energy delivered to the CDP for each year is shown in the table below. The table shows that the share of gas energy production arising from CB#4 is 6.6% in 2009, 6.3 % in 2010, and is 16.0% in 2011. These factors are used to discount monitored parameters as described above.

Wellhead Meter ID	Gas production by vintage (MMBtu)		
	2009	2010	2011
CB#4(VW011)	5,045	5,194	11,688
CM _{CDP} (Previous)	76,588	83,040	73,236
EP _{VW011}	6.6%	6.3%	16.0%

The modification of monitored parameters listed above has been carried out in the ex post calculations of project emission reductions provided at validation, and revisions to the parameters reported in the monitoring report submitted for verification have been made. **All reported values in this monitoring report (section 3.2) have been updated as necessary.**

2.3 Grouped Project

The project is a grouped project but no new instances of the project were implemented during the period since the project start date to the end of this monitoring period. A new instance with 11 new wells is expected to be implemented by the end of 2012.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data Unit / Parameter:	CEF _{ELEC}
Data unit:	kg CO ₂ / kWh
Description:	Carbon emission factor for electricity from the WECC Rockies grid sub-region
Source of data:	US EPA eGRID 2007
Value applied:	0.854 for 2009 & 2010 0.865 for 2011
Purpose of the data:	Parameter is used in the project emission calculations, for electricity used to capture and treat gas
Any comment:	Updated periodically

Data Unit / Parameter:	CEF _{CH4}
Data unit:	tCO ₂ / tCH ₄
Description:	Carbon emission factor for methane combustion
Source of data:	VM0014; IPCC 2007
Value applied:	2.75
Purpose of the data:	Parameter is used in the project emission

	calculations, for combustion of captured methane
Any comment:	

Data Unit / Parameter:	EF _{gas}
Data unit:	kg CO ₂ / MMBtu
Description:	Carbon emission factor for natural gas combustion replaced by the project activity
Source of data:	VM0014; IPCC 2007
Value applied:	53.06
Purpose of the data:	Parameter is used in the baseline emissions calculation to determine emissions replaced by the project activity
Any comment:	Constant for project duration

Data Unit / Parameter:	GWP _{CH4}
Data unit:	N/A
Description:	Global warming potential of methane
Source of data:	VM0014; IPCC 2007
Value applied:	21
Purpose of the data:	Parameter is used to convert methane emissions to carbon dioxide equivalent for project and baseline emissions calculations
Any comment:	

Data Unit / Parameter:	CEF _{FossilFuel}
Data unit:	kg CO ₂ / MMBtu
Description:	Carbon emission factor for coalbed methane fuel gas
Source of data:	<i>Ex ante</i> gas composition analysis
Value applied:	58.86
Purpose of the data:	Parameter is used to calculate project emissions from the use of CBM as fuel gas to capture and destroy methane
Any comment:	Assumed constant for project duration

Data Unit / Parameter:	Den _{CH4}
Data unit:	Metric tonnes / mmscf

Description:	Density of methane at 14.74 psi and 60 °F
Source of data:	<i>Ex ante</i> gas composition analysis
Value applied:	19.22
Purpose of the data:	Parameter is used to convert methane flow rates from mmscf as measured to metric tonnes
Any comment:	

Data Unit / Parameter:	CBM _{CH4}
Data unit:	Metric tonnes / MMBtu
Description:	Factor to convert MMBtu of coalbed methane gross calorific value to tonnes of methane, based on average methane content
Source of data:	<i>Ex ante</i> gas composition analysis
Value applied:	0.019
Purpose of the data:	Parameter is used to convert MMBtu values from gas sales invoices into tonnes of methane equivalent contained in gas sold, used for both project and baseline emission calculations
Any comment:	Assumed constant for project duration

3.2 Data and Parameters Monitored

Data Unit / Parameter:	PC _{1,CH4,CDP}
Data unit:	% wet (v/v)
Description:	Concentration of methane in the CBM delivered and sold to Red Willow at the central delivery point (CDP).
Source of data:	Portable gas chromatograph used at sample point located at the CDP, near flow meter # 0410501
Description of measurement methods and procedures to be applied:	Gas samples are taken at regular intervals using a PGI International gas interceptor. The machine automatically takes a small gas sample approximately each 30 minutes and stores the sample in a 300 cc bottle. Each month, a Red Willow field technician will empty the gas cylinder and run a composite sample through a portable gas chromatograph. Using this approach, the GC analysis is performed once monthly, but is representative of nearly continuous monitoring since the gas cylinder contains 4500 samples

	spaced at regular 30 minute intervals for a 31 day period. The portable gas chromatograph takes monthly readings and the data is downloaded to a computer in the office after each sample is taken.
Frequency of monitoring/recording:	Sampling is performed every 29 minutes and 46 seconds, but data captured and recorded monthly.
Value monitored:	3 year average is 57.79%
Monitoring equipment:	A PGI International Gas Sampler with model number PF3MP and serial number 032516. An Agilent Technologies 3000 Micro Gas Chromatograph, various serial numbers.
QA/QC procedures to be applied:	Red Willow field technicians calibrate portable gas chromatographs on a daily basis. Calibration is performed using a standard gas cylinder. GC's are baked-out weekly to remove water build-up and each unit is inspected monthly.
Calculation method:	N/A
Any comment:	

Data Unit / Parameter:	PC ₁ NMHC, CDP
Data unit:	% wet (v/v)
Description:	Concentration of non-methane hydrocarbons in the CBM delivered and sold to Red Willow at the CDP.
Source of data:	Portable gas chromatograph used at sample point located at the CDP, near flow meter # 0410501
Description of measurement methods and procedures to be applied:	Gas samples are taken at regular intervals using a PGI International gas interceptor. The machine automatically takes a small gas sample approximately each 10 minutes and stores the sample in a 300 cc bottle. Each month, a Red Willow field technician will empty the gas cylinder and run a composite sample through a portable gas chromatograph. Using this approach, the GC analysis is performed once monthly, but is representative of nearly continuous monitoring since the gas cylinder contains 4500 samples spaced at regular 10 minute intervals for a 31 day period. The portable gas chromatograph takes monthly readings and the data is downloaded to a computer in the office after each sample is

	taken.
Frequency of monitoring/recording:	Sampling is performed every 29 minutes and 46 seconds, but data captured and recorded monthly.
Value monitored:	This value is less than 1% in each month
Monitoring equipment:	A PGI International Gas Sampler with model number PF3MP and serial number 032516. An Agilent Technologies 3000 Micro Gas Chromatograph, various serial numbers.
QA/QC procedures to be applied:	Red Willow field technicians calibrate portable gas chromatographs on a daily basis. Calibration is performed using a standard gas cylinder. GC's are baked-out weekly to remove water build-up and each unit is inspected monthly.
Calculation method:	N/A
Any comment:	%NMHCs are neglected unless they cumulatively account for >1% of the processed gas.

Data Unit / Parameter:	CONS _{FossilFuel,PJ}
Data unit:	MMBtu
Description:	Million Btus of coal bed methane consumed by gas engine driven compressors located at the vent wellheads and the CDP.
Source of data:	Monthly Red Willow gas sales invoices, wellhead compressor fuel use reported as "Vent Gas Fuel Charge" on invoice.
Description of measurement methods and procedures to be applied:	CBM consumption is metered with a flow meter located near the CDP and maintained by Red Willow Gathering Company. Monthly totals appear on gas sales invoices.
Frequency of monitoring/recording:	Continuously
Value monitored:	3 year total of 57,194
Monitoring equipment:	The gas flow rates are determined using a Daniel orifice type flow meter with a static pressure range of 500 psi and a differential pressure range of 250 psi, a meter tube diameter of 2.067 inches and an orifice diameter of 0.5 inches. A Fisher recorder, with serial number 16984801 is used to meter and record the gas flow rates. The gas flow meter has been assigned the system number 0400501 by Red Willow.
QA/QC procedures to be applied:	Gas flow meters are calibrated four times annually by Red Willow field technicians and monthly gas composition is determined using portable gas chromatographs which are

	calibrated daily. All data is stored on-site at Red Willow offices in Durango, and is remotely backed up.
Calculation method:	Gas Btu content determined from volumetric consumption and gas composition using Flow Calc software.
Any comment:	Four measuring equipment inspection and calibration reports have been provided to DNV for inspections occurring over the monitoring period. Monitored values have been revised per the description provided in section 2.2 above.

Data Unit / Parameter:	CM _{MECH,CS,PJ}
Data unit:	MMBtu
Description:	Million Btu of coal bed methane used by engine driven compressors at the Red Cedar Coyote Gulch Compression station.
Source of data:	Monthly Red Willow gas sales invoices, compressor fuel allocation reported as "Coyote Compressor Fuel" on invoice.
Description of measurement methods and procedures to be applied:	CBM consumption is metered with a flow meter located at the compressor station and maintained by Red Willow Gathering Company. Monthly totals appear on gas sales invoices.
Frequency of monitoring/recording:	Continuously
Value monitored:	3 year total of 23,770
Monitoring equipment:	An orifice type flow meter measures flow rates, with a Fisher FloBoss recorder / monitor with serial number 17957472. Red Willow assigns the number 0269901 to this station.
QA/QC procedures to be applied:	Gas flow meters are calibrated four times annually by Red Willow field technicians and monthly gas composition is determined using portable gas chromatographs which are calibrated daily. All data is stored on-site at Red Willow offices in Durango, and is remotely backed up.
Calculation method:	Gas Btu content determined from volumetric consumption and gas composition using Flow Calc software.
Any comment:	Gas consumption apportioned to the fugitive CBM is prorated by Red Willow. Monitored values have been revised per the description provided in section 2.2 above.

Data Unit / Parameter:	CM _{MECH,TP,PJ}
Data unit:	MMBtu
Description:	Million Btus of coal bed methane used in engine driven compressors, process heating equipment, and reboilers located at the Red Willow Coyote Gulch Treating Plant.
Source of data:	Monthly Red Willow gas sales invoices, fuel use allocation is 5.5% of CBM delivered to the CDP
Description of measurement methods and procedures to be applied:	CBM consumption is metered with a flow meter located at the treating plant and maintained by Red Willow Gathering Company and prorated to the project on a Btu basis. Monthly totals appear on gas sales invoices.
Frequency of monitoring/recording:	Continuously
Value monitored:	3 year total of 11,619
Monitoring equipment:	various; maintained by another party
QA/QC procedures to be applied:	Gas flow meters are calibrated four times annually by Red Willow field technicians and monthly gas composition is determined using portable gas chromatographs which are calibrated daily. All data is stored on-site at Red Willow offices in Durango, and is remotely backed up.
Calculation method:	Gas Btu content determined from volumetric consumption and gas composition using Flow Calc software.
Any comment:	Gas consumption apportioned to the fugitive CBM is prorated by Red Willow. Monitored values have been revised per the description provided in section 2.2 above.

Data Unit / Parameter:	CM _{GAS,PJ}
Data unit:	MMBtu
Description:	Million Btu of gas purchased by Red Willow at the CDP. This value, less fuel use deductions, is the amount of gas ultimately sold to Kinder Morgan and pipelined.
Source of data:	Monthly Red Willow gas sales invoices, labeled as "Net Receipts" on invoice.
Description of measurement methods and procedures to be applied:	Captured aggregated CBM is metered with a flow meter located at the CDP and maintained by Red Willow Gathering Company.
Frequency of monitoring/recording:	Continuously
Value monitored:	3 year total of 175,550
Monitoring equipment:	The gas flow rates are determined using a Daniel orifice type flow meter with a static pressure

	range of 250 psi and a differential pressure range of 250 psi, a tube ID of 3.068 inches and an orifice diameter of 1.750 inches. An Emerson recorder is used to meter and record the gas flow rates. The gas flow meter station has been assigned the system number 0410501 by Red Willow. Daniel orifice flow meter SN: 08250275 Meter Tube Number: F080118-006 Emerson FloBoss SN: 18329633
QA/QC procedures to be applied:	Gas flow meters are calibrated four times annually by Red Willow field technicians and monthly gas composition is determined using portable gas chromatographs which are calibrated daily. All data is stored on-site at Red Willow offices in Durango, and is remotely backed up.
Calculation method:	Gas Btu content determined from volumetric consumption and gas composition using Flow Calc software.
Any comment:	Four measuring equipment inspection and calibration reports have been provided to DNV for inspections occurring over the monitoring period. Monitored values have been revised per the description provided in section 2.2 above.

Data Unit / Parameter:	CEF _{NMHC}
Data unit:	tCO ₂ /tNMHC
Description:	Carbon emission factor for non-methane hydrocarbons contained in the product gas
Source of data:	Computed from annual average gas composition and known gas properties
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	Based on monthly gas composition analysis
Value monitored:	2.97
Monitoring equipment:	
QA/QC procedures to be applied:	
Calculation method:	Gas mole percentages are converted to mass percentages and finally to energy using known gas properties
Any comment:	Total % NMHC is less than 1%, so this is not used in ex ante calculations

Data Unit / Parameter:	CONS _{ELEC,PJ,Specific}
Data unit:	kWh/MMBtu
Description:	Specific consumption of electricity by equipment used to treat CBM to pipeline quality natural gas.
Source of data:	Calculated from total gas production and total electricity purchase invoices, over the reporting period
Description of measurement method and procedures to be applied:	Electricity will be metered by the La Plata Electric Association electric meters located on-site and monthly invoices with kWh totals are sent to Red Willow.
Frequency of monitoring/recording:	Consumption is monitored continuously and recorded monthly
Value monitored:	1.90
Monitoring equipment:	Electric meters located at the Coyote Gulch treating plant
QA/QC procedures to be applied:	Electric invoices are received monthly by Red Willow and are stored electronically.
Calculation Method:	Total electricity consumed during each month of the reporting period divided by total energy of gas delivered during each month of the reporting period.
Any comment:	

Data Unit / Parameter:	Vol _{VW011,y}
Data unit:	MCF
Description:	Thousand standard cubic feet of fugitive coal bed methane captured by the project from the Cinder Buttes #4 well (well ID: VW011) in year y. This well is not part of the project boundary and needs to be excluded from calculations of project and baseline emissions.
Source of data:	Monthly reports issued by Red Willow
Description of measurement methods and procedures to be applied:	Gas flow rates are metered with a V-Cone differential pressure flow meter, volumes are corrected for temperature and pressure.
Frequency of monitoring/recording:	Flow rates are measured continuously
Value monitored:	3 year total of 30,521
Monitoring equipment:	The gas flow rates are determined using McCrometer VCone flow meter and differential pressure recorder manufactured by Kim Ray. The accuracy of the VCone flow meter is $\pm 0.5\%$ of the

	reading value. The flow meter is installed in a pipe with ID of 1.939 inches and a 1.551 inch diameter Vcone. The device is tested and calibrated to measure a static pressure range of 500 psia and a differential pressure range of 150 psia. The gas flow meter station has been assigned the system number VW011 by Red Willow The Vcone flow meter has S/N: 06-5236 The Kim Ray recorder has S/N: 243
QA/QC procedures to be applied:	Flow meter calibration is performed two to three times annually by Red Willow field technicians. All data is stored on-site at Red Willow offices in Durango, and is remotely backed up.
Calculation method:	N/A
Any comment:	

Data Unit / Parameter:	Btu _{VW011,y}
Data unit:	Btu/scf (wet)
Description:	Average energy content of gas produced by the Cinder Buttes #4 well (well ID: VW011) in year y. This well is not part of the project boundary and needs to be excluded from calculations of project and baseline emissions.
Source of data:	Monthly reports issued by Red Willow
Description of measurement methods and procedures to be applied:	Gas composition analysis is used to determine Btu content
Frequency of monitoring/recording:	Two to three times annually
Value monitored:	718.43
Monitoring equipment:	Portable gas chromatographs are used. Red Willow uses a number of different portable GC's so a specific serial number cannot be reported.
QA/QC procedures to be applied:	Gas composition analysis is performed two to three times annually by Red Willow field technicians. Portable gas chromatographs are used and these are calibrated regularly. All data

	is stored on-site at Red Willow offices in Durango, and is remotely backed up.
Calculation method:	Gas composition analysis data is loaded into Flow-Calc software for analysis, average Btu/scf content is reported on a wet basis.
Any comment:	

3.3 Description of the Monitoring Plan

Monitoring at SUIT is required to establish the volumes of methane which are injected into the natural gas pipeline. This volume of injected methane defines the gross volume of methane emissions prevented from escaping to the atmosphere. Flow meters and a gas chromatograph take measurements of the total flow of gas being pipeline injected as well as the concentration of methane by volume. The monthly sales volumes in million Btu of gas (MMBtu) are available from gas sales invoices and are used for emission reduction calculations. Electricity and fossil fuel consumption required by the project to compress and treat gas are available from sales invoices and utility invoices. SUGF and its partners Red Willow Gathering Company and Red Cedar Production Company are responsible for all field operations and data collection and management. Table 1 presents the location of unit operations and monitoring equipment used by the project. See section 3.4 for additional details.

Table 1: Data Collection and Monitoring

Location	Function	Monitoring & Reporting of Data
Interception Wells & Collection system	There are a total of 16 wellheads used in the project, each with a gas engine driven compressor and a gas flow meter. These wells intercept methane from the seam, and the collection system aggregates gas from the various wells.	Coalbed methane ("Vent Gas Fuel") is purchased from Red Willow and delivered to engine driven wellhead compressors. Quantities of CBM gas combusted by the compressors are reported in gas purchasing invoices as "Vent Well Fuel Charge". Gas composition analysis of CBM fuel gas combusted is provided along with invoices, this is used to calculate $CEF_{FOSSFUEL}$.
Central Delivery Point (CDP)	The CDP meters the total gas flow rate captured by the interceptor well system, and is the point of custody transfer to Red Cedar. A gas interceptor takes gas samples every 30 minutes and stores them in a gas cylinder. A portable gas chromatograph takes monthly gas samples from the cylinder to determine gas composition and Btu value.	Flow meter and GC record data to a plant computer. Gas composition analysis is used to determine NMHC content and BTU value. Flow meter used to establish volumes sold to Red Willow. A second flow meter located near the CDP is installed on the pipeline which supplies the wellhead compressors (from above) with CBM fuel. The same process is used to establish Btu value.
Red Willow Coyote Gulch Compressor Station	Dehydration and pressurization of gas prior to gas treatment. Here CDP gas from the	Quantities of captured methane used for mechanical energy generation are reported in gas purchasing invoices as "Coyote Compressor Fuel".

	interceptor project is blended with CBM captured from surrounding operations.	
Red Cedar Coyote Gulch Treating Plant	Gas upgrading for pipeline injection; includes H ₂ S removal, CO ₂ removal by amine scrubbers	Quantities of captured methane used for mechanical energy generation are reported at 5.5% of CDP gas in the gas sales invoices. Electricity used to treat gas is reported in LPEA purchase invoices. Net gas delivered to the pipeline is equal to the gross gas sold at CDP less gas used to generate mechanical energy at the compressor station and the treating plant.

3.3.1 Roles and responsibilities

Monitored data at the project site are analyzed and summarized monthly. Two field operations companies are responsible for data monitoring and quality control and assurance. Red Willow Gathering & Treating Company provides maintenance support and operates the interceptor well system, the CDP and the gas upgrading facility. Red Cedar Production Company operates the gas compression station. SUIT receives monthly gas purchase invoices from Red Willow which summarize gross production and sales, captured CBM gas which is consumed onsite for mechanical energy generation, and CBM fossil fuel purchases from Red Willow.

Additionally, Red Willow is responsible for maintaining and calibrating all data acquisition and storage equipment including gas flow meters and gas chromatographs.

A consultant to SUIT, WSP Environment & Energy, will be responsible for aggregating and managing monitoring data necessary to calculate project emission reductions according to the monitoring plan outlined in the Project Description. WSP will also prepare monitoring reports and assist with project validation and verification.

SUIT staff will be responsible for summarizing and supplying WSP with the methane concentration data on a weighted monthly average basis. Additionally, SUIT will be responsible for supplying WSP with electronic copies of gas sales invoices and electricity purchase invoices.

3.3.2 Data Collection / Monitoring Equipment

A flow meter located at the central delivery point (CDP) meters the volume of captured fugitive CBM which is collected and supplied to Red Willow for processing and ultimately to Kinder Morgan. A gas interceptor system automatically takes small (0.2 cc) gas samples each 30 minutes and stores these in a 300 cc gas cylinder. A portable gas chromatograph takes monthly readings from this gas cylinder to determine gas composition, which together with continuous volumetric flow rate data, is used to establish the gas Btu content. Monthly totals appear on gas sales invoices.

The CDP represents the transfer of custody from SUIT to Red Cedar but not the point of sale to the final gas buyer.. Gas processing downstream of the CDP is tracked and included in the

project boundary. The PC hard drives will store data for the entire duration of the project and an additional 2 years thereafter. The PC can be accessed and data can be downloaded remotely by SUIT staff.

The SUIT project also purchases CBM from Red Willow to operate the wellhead compressors and process equipment at the CDP. This fuel gas is metered at a location near the CDP (meter # 0410501) before the stream is split and sent to both locations. Again, a portable GC samples the stream to determine the gas composition on a regular basis. These data are used to determine the Btus purchased by the project.

Gas flow meters are calibrated four times per year according to a company procedure. A copy of a gas flow meter calibration records for the CDP gas sales meter (gas sold by the project) and the vent fuel gas meter (gas consumed by project) is provided along with this report. Gas composition analysis is conducted monthly using portable gas chromatographs at various locations. Portable GCs are calibrated each day prior to use by Red Willow field technicians according to a company procedure which uses a standard gas cylinder. A copy of the GC Standard Operation Procedure is provided along with this report.

Downstream of the transfer of custody, Red Willow & Red Cedar both use captured coalbed methane pulled directly off of the product stream to operate mechanical energy generation equipment such as engine driven compressors and process heaters. Energy used to operate these equipment are prorated to the quantity of natural gas produced by the interceptor well project and are reported as MMBtu deductions on the sales gas invoices received by SUIT. The difference between gross gas sent to the CDP and these deductions represent the net production quantity being injected into the natural gas pipeline. All gas sales invoices will be kept by SUIT for 2 years following the end of the project activity. The same procedure as described above is used here to determine the gas flow rate and composition used to develop Btu energy consumption values.

Fossil Fuel Consumption

Coalbed methane is purchased by the project from Red Cedar and is piped to the interceptor wellhead compressors and used to evacuate fugitive methane from the seam. Red Willow reports monthly gas purchase quantities on the sales gas invoices that SUIT receives. In addition, Red Willow provides a gas composition analysis for the CBM fuel gas combusted by the compressors. This is used to determine the MMBtu quantity of fuel gas sold to the project. This is also used by the project to develop a carbon emission factor for the gas which is determined ex ante and used throughout the project crediting period. Red Willow is responsible for maintaining the accuracy and integrity of gas flow meters and the gas chromatograph which are used. All gas sales invoices will be kept by SUIT for 2 years following the end of the project activity.

Electricity Consumption

Electric power is supplied to the Red Willow Coyote Gulch Gas Treating Plant by La Plata Electric Association (LPEA), a Rural Electric Cooperative. Monthly electricity purchase invoices are tracked by Red Willow and are pro-rated to the quantity of gas produced by the interceptor well project. These data are not reported on gas sales invoices, but are provided separately by Red Willow staff to the project. LPEA is responsible for maintaining the accuracy of electric meters

located on-site. All electricity purchase invoices will be kept by Red Willow for 2 years following the end of the project activity.

3.3.3 Quality Assurance

Volumes of coalbed methane captured and sold by the project, purchased by the project, and used by the project to generate energy used to capture methane are all metered and using differential type gas flow meters. Each flow meter used by the project has an assigned meter number and is inspected and calibrated by Red Willow field technicians four times annually. Copies of inspection and calibration records have been provided to the project validator.

The composition of coalbed methane captured and sold by the project, purchased by the project, and used by the project to generate energy used to capture methane are all determined using a portable gas chromatograph. GCs are calibrated daily before each use according to a Red Willow company procedure. A standard gas cylinder is used during the calibration and equipment is regularly inspected to ensure accuracy. A copy of the operations and maintenance procedure produced by Red Cedar and used by Red Willow technicians has been provided to the project validator.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Baseline emissions for the project include emissions of natural gas combustion replaced by the project activity as well as baseline methane releases to the atmosphere of fugitive methane avoided by the project. The avoided fugitive methane emission rates in the baseline are equal to methane removal rate by the project.

Monitoring Period	Vintage	BE _{MR} (tCO ₂ e)	BE _{Use} (tCO ₂ e)	BE (tCO ₂ e)
1-Jan-09 to 31-Dec-09	2009	28,648	3,172	31,820
1-Jan-10 to 31-Dec-10	2010	31,172	3,478	34,650
1-Jan-11 to 31-Dec-11	2011	24,647	2,665	27,312
Sum of Reporting Period		84,647	9,315	93,782

4.2 Project Emissions

The emissions generated by the project through the use of electricity and CO₂ generated from the combustion of coalbed methane used for energy generation are summarized in the two tables below for these two periods.

Monitoring Period	Vintage	PE _{ME} (tCO ₂ e)	PE _{MD} (tCO ₂ e)	PE (tCO ₂ e)
1-Jan-09 to 31-Dec-09	2009	1,144	3,752	4,895
1-Jan-10 to 31-Dec-10	2010	1,366	4,105	5,471

1-Jan-11 to 31-Dec-11	2011	1,143	3,237	4,380
Sum of Reporting Period		3,653	11,093	14,746

4.3 Leakage

As discussed in the PD, project leakage emissions are considered to be zero.

4.4 Summary of GHG Emission Reductions and Removals

The emissions reductions achieved by the project are presented for the first two years in the tables below.

Monitoring Period	Vintage	PE (tCO ₂ e)	BE (tCO ₂ e)	ER (tCO ₂ e)
1-Jan-09 to 31-Dec-09	2009	4,895	31,820	26,925
1-Jan-10 to 31-Dec-10	2010	5,471	34,650	29,179
1-Jan-11 to 31-Dec-11	2011	4,380	27,312	22,932
Sum of Reporting Period		14,746	93,782	79,036

This monitoring report is summarized as follows:

Period: January 2009 through December 2011

Project Emissions: 14,746 tCO₂ equivalent

Baseline Emissions: 93,782 tCO₂ equivalent

Emission Reductions: 79,036 tCO₂ equivalent

5 ADDITIONAL INFORMATION

N/A